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Notes on Contagious Abortion in Pony and Donkey Mares

BY

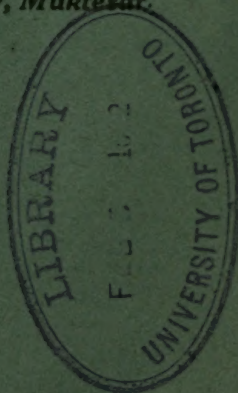
R. BRANFORD, M.R.C.V.S.,

Superintendent, Government Cattle Farm, Hissar

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Notes on Contagious Abortion in Pony and Donkey Mares.

(Received for publication on 18th February, 1921.)

OUR reason for publishing the following statistics and our comments thereon is the poverty of veterinary literature on the subject. The statistics also may possibly be of some value to anyone engaged in investigating the disease.

Mules and donkeys have been bred at the Government Cattle Farm, Hissar, since 1903. Our experience dates from 1911. On an average, 75 pony mares for mule-breeding and 75 donkey mares for donkey-breeding have been maintained on the farm since that date.

Pony mares for mule-breeding were mostly purchased in the Punjab fairs, and the numbers are maintained by fresh purchases from time to time.

No donkey mares have been purchased since 1907. Since that date the donkey herd has been kept up by introduction of farm-bred fillies

From Table III below, it will be seen that abortion became the source of serious losses from the year 1914 onwards.

Cases of abortion were not unknown in previous years, but had never exceeded one or two annually.

INTRODUCTION OF THE DISEASE TO THE FARM.

There is little doubt that the disease was introduced by one or more purchased pony mares. It has always been a matter of difficulty to purchase mares suitable for breeding the class of mule required (Mountain Battery mules) as such mares are also suitable for horse and pony-breeding. The Indian owner does not usually readily sell a good brood mare. Most of the mares which are sent to fairs or come into dealers' hands owe their position to the fact that they are shy breeders, or have perhaps already aborted.

Of the mares purchased since 1911, several were in-foal at the time of purchase. One, No. 76, aborted after only 49 days on the farm. She was probably responsible for the introduction of the disease.

IS THE ORGANISM THE SAME IN EQUINES AND ASSES ?

As we state below, the organism we believe to be the cause is morphologically the same.

One or two clinical and other factors, however, suggest that they may be different.

The figures indicate that, if the organism is the same, the equines were at first at any rate more susceptible.

In the 1920 outbreak at Chaoni, during August and September, 20 out of 35 in-foal donkey mares aborted, three in-foal pony mares were running with them all the time. None of these three up-to-date (January 15th, 1921) have aborted.

All three have bred several foals. One had aborted once before in 1914.

Pony mares usually abort at an earlier period of gestation than donkey mares.

Possibly the organism is the same in each animal, but has become gradually more accustomed to growth in donkeys and has become correspondingly more virulent for them.

SYMPTOMS.

In both cases, unless the mare is far gone in pregnancy, the symptoms are nil.

The mare has no temperature either before or after the act. She does not go off her feed, and has rarely a visible discharge.

Mares on the farm are usually divided as follows :—

- (1) Donkey and pony mares with foals at foot.
- (2) Donkey and pony mares known to be in-foal.

(In the case of pony mares after four months' gestation, and in the case of donkey mares after five months' gestation).

- (3) Other donkey mares.
- (4) Other pony mares.

These herds are grazed separately and are brought at night into separate yards.

We have on several occasions found an aborted foetus in the morning in a yard with 20 or 30 mares, and been at a loss to discover which mare had aborted.

Manual examination gives no certain clue. Dilation of the os, after abortion of a three or four months' foetus, is no more than is normal in many brood mares.

Mares aborting in the later stages of pregnancy sometimes show premonitory symptoms.

After the act in their case there may be some thin slimy greyish white discharge. We have never seen the chocolate-coloured discharge described by American observers. They usually come into milk, and may show some rise of temperature for a few days.

THE FOETUS.

The membranes and fluids are normal in appearance. If nearly full time, the foetus may be alive. It may at first appear healthy and bright. After a few days symptoms of joint evil supervene. All premature foals on this farm, suspected to be premature owing to contagious abortion, have eventually died.

The following post-mortem notes were made on a donkey foal born after 11 months' gestation, which died three days after birth :—

Subcutaneous tissues. Stained yellow.

Pleural and peritoneal fluids excessive.

Liver. Much enlarged. Cirrhotic.

Kidneys. Enlarged. Contained numerous abscesses about the size of a pea.

Lungs. Contained abscesses similar to those in the kidneys.

Right hock. Swollen. Purulent.

A bacillus morphologically similar to that cultured from earlier cases of abortion was cultivated from the kidney abscesses.

ETIOLOGY.

On several occasions material has been sent to the Imperial Bacteriological Laboratory at Muktesar. One pony and one donkey mare were also sent immediately after aborting.

Lack of staff at the laboratory has prevented much work being done on the subject there, but on one occasion an organism was isolated, believed to be the cause of the disease.

Our own efforts on the spot to isolate the causal organism have been confined to the 1920 outbreak, and have been handicapped by the intense heat, lack of laboratory appliances and facilities, and too much routine work.

However, a bacillus has been isolated in pure culture morphologically and culturally resembling the organism described by Good and Corbett (*Journal of Infective Diseases*, Vol. XIII, July 1913).

Bacillus from pony mares. A pure culture of the organism was obtained by inoculating plain agar tubes with blood from foetal heart and liver. It grew well at room temperature (33°C.), in 24 hours showing as a faintly white film. In some of the tubes there was distinct wrinkling of media at the bottom of the growth, at the water of condensation. The organism was a short thick bacillus, with rounded ends. Gram negative.

Bacilli from donkeys. Smears made from the allantoic and amniotic fluids of an aborted foetus showed numerous very short thick bacilli in pure culture. Gram negative.

Plain agar tubes inoculated from foetal heart, liver and stomach showed a good growth in 24 hours at room temperature (33°C.). The appearance of the growth was identical with that of the organism obtained from the pony mares.

METHOD OF INFECTION AND PERIOD OF INCUBATION.

Wallis Hoare's Text-Book on Veterinary Medicine (reference, equine contagious abortion) states that ingestion is the common method of infection, and limits the period of incubation from 10 days to three weeks.

The incidence of our cases certainly points to ingestion being the common method of infection, but if so the incubation period in donkey mares probably exceeds three weeks.

The 1920 outbreak in donkeys began on July 15th in a herd of 35 donkey and three pony mares. On August 3rd, these animals were moved to entirely fresh ground and yards over two miles from the site of the outbreak.

Twenty-one of the donkey mares aborted between August 3rd and September 15th. After moving on August 3rd the animals were very carefully watched, several cases were detected and removed before abortion took place, and the remainder immediately after the event. In each case the area was disinfected by fire, and the remaining donkeys were moved in to a fresh yard and everything possible was done to prevent any further infection by ingestion.

If the donkeys were all infected before the move on August 3rd, then the period of incubation must extend to six weeks.

METHOD OF PREVENTION.

Our success in previous years in limiting outbreaks points to ingestion as being the common method of infection. Our routine procedure for dealing with cases up to date has been :—

- (1) Aborting mares are isolated for a minimum period of six weeks. Vaginal passages and uterus are washed out daily with a disinfectant lotion for first 10 days, and three times a week during the remaining period in isolation.
- (2) The site on which aborted foetus is found is disinfected by fire, and the foetus and its membranes, etc., are burnt on the spot.
- (3) Other mares of the herd with which the aborting mare was running are removed into fresh quarters, and on to fresh grazing ground.

The chief difficulty in dealing with the disease is the ever present possibility that a mare may abort on the grazing ground, and the fact go undiscovered.

The absence of symptoms and discharge in the majority of cases, coupled with the fact that the aborted foetus and membranes are eaten by vultures a few minutes after the act if left unguarded, makes it impossible to guard completely against this contingency.

IMMUNITY.

Pony mares. The immunity, if any, conferred by one attack of the disease is not a lasting one.

It is insufficient to protect the animal for any length of time against subsequent exposure to infection. Nine (19 per cent.) mares aborted a second time, and as four of the nine bred normal foals between the first and the second act, the second abortion, therefore, in these four cases could not have been due to a persistence of the causal organism in the uterus, but must have been due to reinfection.

One mare aborted twice with an interval of a year, two mares twice within two years, and four others aborted a second time with intervals of about three years.

Whether the remaining pony mares have acquired immunity from the first attack, or the precautions taken to prevent reinfection have been successful, is difficult to say; probably the latter view is the correct one.

PERIOD OF GESTATION.

Pony mares. The majority (71.4 per cent.) of the cases occurred between the third and sixth month of gestation; nevertheless, cases may occur at any period of pregnancy. In those mares which aborted twice, the second act in most of the cases took place at an earlier period of pregnancy than the first one. (Table IV.)

Donkey mares. The immunity in donkey mares is stronger than in horse mares. It appears to be an active immunity. On this farm during the last ten years only two donkey mares (Nos. 47 and 137) have aborted a second time, and in the case of one of these (No. 137) there was an interval of ten years between the first and second act of abortion.

In donkey mares abortion usually occurs at a later period of gestation than in the case of horse mares.

During the first four months of pregnancy 7.8 per cent. of cases occurred, from the fifth to the eighth month 52.7 per cent., and from 9th to 12th month 39.4 per cent. of cases occurred.

STERILITY.

The question of sterility as a sequel of contagious abortion is an important one.

Pony mares. The after history of the 38 pony mares is interesting and may be seen from following table :—

Sold	Died or destroyed	Sterile	Normal parturition after abortion	Not bred from again
5	4	5	18	5

This table does not include No. 93 which had two full-time dead foals in the years following the abortion.

It will be seen that, out of 23 mares which aborted and were covered again, 18 (78·2 per cent.) bred normal foals at some period during the following years. The 5 (21·7 per cent.) mares which are shown as sterile were both covered and artificially inseminated repeatedly, and it is only after many attempts have failed to get them in foal that we state they are sterile.

Donkeys. As the majority of the cases of abortion in donkey mares occurred in 1920, it is too soon yet to arrive at any conclusions of the percentage of cases of sterility which may be caused by the disease.

BOVINE ABORTION.

Table V shows the percentage of cows which have aborted on this farm during the last eight years.

In 1916 when the percentage reached the high figure of 12·5 per cent. a proportion may have been due to debility in the mothers. In 1916 the monsoon completely failed and the cows were living under famine conditions from January to August.

We have not been able to do much work on this subject, but serum from some of the cows which have recently aborted has been found to agglutinate Bang's bacillus.

It seems probable that the majority of the cases may be of contagious abortion. In that case the majority of the farm cows must inherit immunity.

TABLE I—*concl'd.*
Contagious abortion in donkey mares, 1914—20.

No.	Date of service	Date of abortion	Age of foetus	Length of time in herd before abortion occurred	History	REMARKS
			M. D.	Y. M. D.		
157	26th February 1917	21st August 1917	5	3	4 21	Bred 2 foals since aborting.
158	22nd May 1920	16th September 1920	4	6	5 16	Has not been served since aborting.
161	22nd June 1918	5th March 1919	8	13	4 11	Did not breed again.
164	24th September 1919	25th August 1920	11	1	6 4 11	Has not been served since aborting.
165	8th January 1920	26th August 1920	7	18	6 4 12	Do. do.
167	12th September 1919	3rd August 1920	11	9	6 3 19	Do. do.
175	17th April 1914	27th October 1914	6	10	0 6 13	Bred 3 foals since aborting.
178	22nd March 1920	30th August 1920	5	8	5 10 16	Has not been served since aborting.
180	8th May 1917	27th January 1918	7	19	3 0 21	Bred 2 foals since aborting.
183	30th May 1917	19th August 1917	2	19	2 7 13	Destroyed.
190	13th November 1919	22nd August 1920	9	9	5 4 22	Has not been served since aborting.
207	13th March 1920	6th September 1920	6	7	4 8 29	Do. do.
240	30th December 1919	4th September 1920	9	4	3 9 21	Do. do.
244	14th October 1919	3rd May 1920	6	19	3 5 20	Do. do.
248	23rd December 1919	5th August 1920	7	12	2 1	Do. do.
259	13th October 1919	24th August 1920	10	11	2 10 19	Do. do.
265	10th January 1920	14th August 1920	2	4	2 4 16	Do. do.
283	24th December 1919	3rd May 1920	4	9	1 2 15	Do. do.
295	13th November 1919	23rd August 1920	9	10	1 4 16	Do. do.

TABLE II.

Contagious abortion in pony mares, 1910—1920.

No.	Date of service	Date of abortion	Age of foetus	Length of time in herd before abortion occurred			History	REMARKS
8 Z.	9th August 1915	16th October 1915	M.	Y.	M.	D.	Purchased Do. Do. Do. Do.	Sold Bred 2 foals since aborting.
15 Z.	22nd May 1910	2nd November 1910	2	11	7	16		
18	21st August 1916	Date unknown	5	6	8	2		
19	28th March 1917	3rd August 1917	.....	.....	.....	.....		
40	22nd January 1914	1st November 1914	4	12	4	3	Do. Do.	Died. Aborted twice at an interval of more than 3 years. Bred no foal during the period between the two acts of abortion. Destroyed.
			9	9	7	1		
49	17th March 1917	23rd December 1917	9	.....	.....	.....	Do. Do. Do.	Destroyed (Surra). Aborted twice at an interval of more than 3 years. Bred one foal between the two acts of abortion.
	25th March 1917	3rd February 1918	10	11	10	3		
58	3rd November 1913	24th January 1914	2	3	9	12	Do. Do.	Bred one foal since second abortion. Destroyed.
								
60	6th September 1916	21st April 1917	7	.....	.....	.....	Do. Do. Do. Do.	Aborted twice at an interval of 5½ years. Bred one foal between the two acts of abortion. Has not been served since last abortion.
69	27th September 1914	16th September 1917	3	6	10	13		
71	16th July 1914	18th November 1914	1	3	7	26	Do. Do.	Died. Aborted twice at an interval of 5½ years. Bred one foal between the two acts of abortion.
		10th October 1914	2	3	5	28		
76	18th August 1919	7th April 1920	7	.....	.....	.....	Do. Do.	Aborted twice at an interval of over 3 years. Probably one of the original introducers of the disease.
	Purchased in foal	10th December 1911	.....	0	1	19		
	26th September 1914	18th February 1915	4	.....	.....	.....	Do.	

TABLE II—*concl'd.**Contagious abortion in pony mares, 1910—1920.*

No.	Date of service	Date of abortion	Age of foetus	Length of time in herd before abortion occurred	History	REMARKS
77	5th June 1913	5th December 1913	M. D.	Y. M. D.		
			6 0	2 1 14	Purchased.	Aborted twice at an interval of nearly 2 years. Bred one foal during interval.
	14th May 1915	6th October 1915	4 22	.....	Do.	Bred one foal since last abortion.
80	20th May 1917	26th September 1917	4 6	5 11 4	Do.	Bred one foal since last abortion.
85	1st May 1914	14th October 1914	5 14	2 6 21	Do.	Bred one foal since aborting.
	10th June 1916	10th October 1916	4 0	.....	Do.	Aborted twice at an interval of 21 months. Bred one foal between the two acts of abortion.
	20th June 1914	10th November 1914	4 20	2 7 16	Do.	Has not been covered since last abortion.
86	14th April 1913	11th October 1913	5 27	1 0 7	Do.	Bred 2 foals since aborting.
92	15th June 1917	27th January 1918	7 9	5 2 18	Do.	Bred 3 foals since aborting.
93	8th May 1916	22nd October 1916	5 14	3 11 13	Do.	Bred one foal since aborting.
97	28th April 1915	2nd November 1915	6 4	2 11 23	Do.	Foaled full time dead foal in 1918.
	19th April 1917	6th September 1917	4 17	4 9 27	Do.	Foaled full time dead foal in 1920.
	7th June 1915	Date unknown	.....	.....	Do.	Bred one foal since aborting.
101	10th September 1915	27th July 1916	10 17	3 8 17	Do.	Bred two foals since aborting.
103					Do.	Has not been bred from again.

104	8th September 1916	20th March 1917	6	12	4	4	9	Do.	Bred 2 foals since aborting.
105	8th August 1914	20th October 1914	2	12	1	7	3	Do.	Do.
107	29th April 1914	7th October 1914	5	8	1	6	20	Do.	In-foal at present.
110	9th May 1915	Date unknown	.....					Do.	Bred one foal since aborting.
111	29th April 1916	18th September 1916	4	19	3	6	1	Do.	Bred 2 foals since aborting.
112	6th October 1915	5th January 1916	2	29	2	8	24	Do.	Aborted twice at an interval of nearly 3 years. Sold.
	12th August 1918	5th November 1918	2	23	.....			Do.	
115	31st August 1915	27th November 1915	2	27	2	7	16	Do.	Did not breed again.
116	4th June 1914	9th November 1914	5	5	12	6	28	Do.	Bred 3 foals since aborting.
120	24th June 1915	25th September 1915	3	1	2	5	14	Do.	Sold.
123	25th July 1913	15th April 1914	8	20	1	0	4	Do.	Sold.
125	16th August 1914	11th February 1915	5	25	1	9	25	Do.	Sent to I. B. L., Mukteear.
126	8th March 1914	15th July 1914	4	7	0	8	15	Do.	Never bred again after aborting.
132	30th December 1916	28th March 1917	2	28	One day			Farm bred	A probable source of infection.
									This mare aborted same day that she was put with brood mares.
140	3rd June 1919	8th October 1919	4	5	1	5	27	Purchased.	} This mare aborted twice, with about one year's interval between the two acts.
114	7th June 1919	9th November 1919	5	2	6	6	28	Do.	
	25th April 1920	16th October 1920	5	21	.....			Do.	

In the case of those mares which are shown as having been destroyed, the cause for which they were destroyed was not in existence at the time of abortion, and has no bearing on the disease.

TABLE III.
Abortions, 1910—1920.

Year	Pony mares	Donkey mares
1910	1	2
1911	1	nil
1912	nil	1
1913	2	nil
1914	11	4
1915	9	nil
1916	6	nil
1917	8	4
1918	3	3
1919	2	2
1920	4	24
TOTAL	47	40

TABLE IV.
Age of foetus of pony mares which aborted twice.

Number of mare	Age of foetus, first abortion	Age of foetus, second abortion
	Days	Days
40	279	276
58	81	225
71	84	229
77	180	142
85	164	120
112	89	86
	152	171

This table does not include Mares Nos. 76 and 93.

No. 76 was purchased in-foal, so the age of the first aborted foetus was unknown.

No. 93 aborted a five month foetus in 1916. In 1918 and again in 1920 this mare had full-time dead foals, which may have been due to the organism of contagious abortion.

TABLE V.
Bovine abortions, 1913—1920.

Year	Calves born	Number of abortions	Percentage
1913	623	36	5.80
1914	783	58	6.80
1915	844	63	6.90
1916	230	33	12.50
1917	1104	69	5.80
1918	1315	63	4.50
1919	1306	41	3.05
1920	563	23	3.90

The fourth column refers to the percentage of abortions on the total number of cows which calved.

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